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**UTILITY
PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 C F R. § 1.53(b))

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents		ADDRESS TO: Assistant Commissioner for Patents Box Patent Application Washington, DC 20231	
1. <input checked="" type="checkbox"/> Fee Transmittal Form (e.g., PTO/SB/17) (Submit an original and a duplicate for fee processing)		6. <input type="checkbox"/> Microfiche Computer Program (Appendix)	
2. <input checked="" type="checkbox"/> Specification [Total Pages 9] <ul style="list-style-type: none"> - Descriptive title of the Invention - Cross References to Related Applications - Statement Regarding Fed sponsored R & D - Reference to Microfiche Appendix - Background of the Invention - Brief Summary of the Invention - Brief Description of the Drawings (if filed) - Detailed Description - Claim(s) - Abstract of the Disclosure 		7. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) <ul style="list-style-type: none"> a. <input type="checkbox"/> Computer Readable Copy b. <input type="checkbox"/> Paper Copy (identical to computer copy) c. <input type="checkbox"/> Statement verifying identity of above copies 	
3. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets 4]		ACCOMPANYING APPLICATION PARTS	
4. Oath or Declaration [Total Pages 2] <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> Newly executed (original or copy) b. <input type="checkbox"/> Copy from a prior application (37 C.F.R. § 1.63(d)) (for continuation/divisional with Box 17 completed) <small>(Note Box 5 below)</small> c. <input type="checkbox"/> DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b). 		8. <input checked="" type="checkbox"/> Assignment Papers (cover sheet & document(s))	
5. <input type="checkbox"/> Incorporation By Reference (useable if Box 4b is checked) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered to be part of the disclosure of the accompanying application and is hereby incorporated by reference therein.		9. <input type="checkbox"/> 37 C.F.R. §3.73(b) Statement (when there is an assignee) <input type="checkbox"/> Power of Attorney	
17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment: <ul style="list-style-type: none"> <input type="checkbox"/> Continuation <input type="checkbox"/> Divisional <input type="checkbox"/> Continuation-in-part (CIP) of prior application No. _____ / _____		10. <input type="checkbox"/> English Translation Document (if applicable)	
Prior application information: Examiner _____		11. <input type="checkbox"/> Information Disclosure Statement (IDS)/PTO-1449 <input type="checkbox"/> Copies of IDS Citations	
18. CORRESPONDENCE ADDRESS		12. <input type="checkbox"/> Preliminary Amendment	
<input type="checkbox"/> Customer Number or Bar Code Label <small>(Insert Customer No. or Attach bar code label here)</small>		13. <input checked="" type="checkbox"/> Return Receipt Postcard (MPEP 503) (Should be specifically itemized) <ul style="list-style-type: none"> • Small Entity <input type="checkbox"/> Statement filed in prior application (PTO/SB/08-12) <input type="checkbox"/> Status still proper and desired 	
Name Bayer Corporation		14. <input type="checkbox"/> Certified Copy of Priority Document(s) (if foreign priority is claimed)	
Address Patent Department 100 Bayer Road		15. <input type="checkbox"/> Other:	
City Pittsburgh		State PA	Zip Code 15205-9741
Country U.S.A.		Telephone (412) 777-2349	Fax (412) 777-5449
Name (First/Type) Noland J. Cheung		Registration No. (Alphanumeric) 39,138	
Signature		Date 11-18-98	

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11/18/98
JC525
U.S. PTO

Approved for use through 03/30/2000. OMB 0651-0032
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FEE TRANSMITTAL

Patent fees are subject to annual revision on October 1.

These are the fees effective October 1, 1997.

Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/08-12. See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT (\$ 800.00)

Complete if Known

Application Number	To Be Assigned
Filing Date	Herewith
First Named Inventor	Bernd Willing
Examiner Name	---
Group / Art Unit	---
Attorney Docket No.	Mo-4861/HE-146

METHOD OF PAYMENT (check one)

1. The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit Account Number 13-3848

Deposit Account Name Bayer Corporation

Charge Any Additional Fee Required Under 37 C.F.R. §§ 1.16 and 1.17 Charge the Issue Fee Set in 37 C.F.R. § 1.18 at the Mailing of the Notice of Allowance

2. Payment Enclosed:

Check Money Order Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Small Entity

Fee Code (\$)	Fee Code (\$)	Fee Description	Fee Paid
101 790	201 395	Utility filing fee	760.00
106 330	206 165	Design filing fee	
107 540	207 270	Plant filing fee	
108 790	208 395	Reissue filing fee	
114 150	214 75	Provisional filing fee	
SUBTOTAL (1)		(\$)	760.00

2. EXTRA CLAIM FEES

Total Claims	Extra Claims	Fee from below	Fee Paid
6	-20** =	X	---
Independent Claims 1	-3** =	X	---
Multiple Dependent			---

** or number previously paid, if greater; For Reissues, see below

Large Entity Small Entity

Fee Code (\$)	Fee Code (\$)	Fee Description
103 22	203 11	Claims in excess of 20
102 82	202 41	Independent claims in excess of 3
104 270	204 135	Multiple dependent claim, if not paid
109 82	209 41	** Reissue independent claims over original patent
110 22	210 11	** Reissue claims in excess of 20 and over original patent
SUBTOTAL (2)		(\$)

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
105 130	205 65	Surcharge - late filing fee or cash	
127 50	227 25	Surcharge - late provisional filing fee or cover sheet	
139 130	139 130	Non-English specification	
147 2,520	147 2,520	For filing a request for reexamination	
112 920*	112 920*	Requesting publication of SIR prior to Examiner action	
113 1,840*	113 1,840*	Requesting publication of SIR after Examiner action	
115 110	215 55	Extension for reply within first month	
116 400	216 200	Extension for reply within second month	
117 960	217 475	Extension for reply within third month	
118 1,510	218 755	Extension for reply within fourth month	
128 2,060	228 1,030	Extension for reply within fifth month	
119 310	219 155	Notice of Appeal	
120 310	220 155	Filing a brief in support of an appeal	
121 270	221 135	Request for oral hearing	
138 1,510	138 1,510	Petition to institute a public use proceeding	
140 110	240 55	Petition to revive - unavoidable	
141 1,320	241 660	Petition to revive - unintentional	
142 1,320	242 660	Utility issue fee (or reissue)	
143 450	243 225	Design issue fee	
144 670	244 335	Plant issue fee	
122 130	122 130	Petitions to the Commissioner	
123 50	123 50	Petitions related to provisional applications	
126 240	126 240	Submission of Information Disclosure Stmt	
581 40	581 40	Recording each patent assignment per property (times number of properties)	40.00
146 790	246 395	Filing a submission after final rejection (37 CFR 1.129(a))	
149 790	249 395	For each additional invention to be examined (37 CFR 1.129(b))	
Other fee (specify)			
Other fee (specify)			
SUBTOTAL (3)		(\$)	40.00

SUBMITTED BY

Typed or Printed Name	Noland J. Cheung	Complete if applicable
Signature		Reg. Number 39,138 Deposit Account User ID

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5 DEVICE FOR INSERTING AND REMOVING
WORK STATIONS CIRCULATING ON A CHAIN

BACKGROUND OF THE INVENTION

To carry out a uniform sequence of working steps at a plurality of work stations, frequently, each individual working step is repeated at a 10 stationary position, wherein a plurality of work stations, driven on a belt or a chain, passes by the location in which each particular working step is carried out.

A uniform sequence of working steps may, for example, be the assembly of a device, wherein the various assembly steps are carried out 15 at different locations and the part to be assembled is moved on a work station from location to location for the various assembly steps to be carried out. A similar arrangement may be used in the production of molded parts, in which the working steps comprise cleaning the mold, providing the mold with a release agent, inserting a displacement body, 20 filling the mold for the first time, curing the first molded part, removing the displacement body, filling the mold for the second time, curing the second mold contents, opening the mold and removing the molded part. Such working steps are carried out at different locations, wherein the mold is conveyed on a work station from one location to the other.

25 The work stations may take the form of work station wagons, wherein the work station wagons are moved by means of connection elements to the circulating chain drive which are provided and/or engaged on the wagons on one side.

The design of work stations in the form of independent work station 30 wagons is particularly applicable when the initial and/or subsequent fitting out of the work station, or intermediate working steps which cannot be carried out on the chain, are carried out away from the conveyor system in

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terms of location. In this case, it may be necessary to remove individual work station wagons from the chain cycle and/or insert them into it.

SUMMARY OF THE INVENTION

The present invention relates to a device for carrying out a sequence of working steps on travelling work station wagons comprising

- a) an oval track wherein said work station wagons are circulating, wherein said wagons comprise at least one detachable connection element connected to a circulating chain which moves said wagons;
- 10 b) at least one insertion and at least one removal guide track is provided on the outside of said oval track, wherein said at least one insertion and at least one removal guide track comprises a transfer point to which the chain is allocated;
- 15 c) at least one coupling element is further provided at each transfer point via which the wagons may be coupled into the guide tracks on the side opposite of the side of said wagons comprising at least one detachable element, with at least one switchable points element located on said guide track, which during the insertion position, release said at least one coupling element and bring about the engagement of said
- 20 detachable connection element to said chain or during the removal position, couple the coupling elements and removably detach said at least one detachable connection from said chain.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagram of the device of the present invention.

- 25 Fig. 2 is an enlarged diagram of the device of the present invention showing the circulating chain drive with a guide channel.
- Fig. 3 shows an enlarged view of the points tongues of the device of the present invention.
- 30 Fig. 4 shows an enlarged view of the insertion of wagon X into the device of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a device for carrying out a uniform sequence of working steps on travelling work station wagons circulating on an oval track, wherein the wagons are moved by means of detachable connection elements to a circulating chain drive. The detachable connection elements are provided and/or engaged on one side of the wagon. The device of the present invention also composes at least one insertion and at least one removal guide track, to each of which a transfer point to the chain is allocated and is provided on the outside of this oval conveyor system. Coupling elements are further provided via which the wagons may be coupled into the guide tracks. On the other side of the wagon, switchable points elements are provided, in which insertion-/removal positions release the connection elements and couple the coupling elements for removal purposes and/or uncouple the coupling elements and bring about the engagement of the connection elements for insertion purposes, which are provided at each transfer point.

An embodiment of the present invention comprises the chain circulating in an oval, for example, and the chain running in a guide channel. The wagons have guide rollers running on vertically projecting mountings in the guide channel and the wagons also comprise at least one carrier pin, wherein carrier cages located on the chain removably engage the carrier pin on the wagon. On the chain side, the transfer point may be designed in such a way that the outer boundary of the guide channel is interrupted so that the guide rollers may emerge laterally out of the guide channel and the carrier pin laterally out of the carrier cage which is open towards the outside.

In an embodiment of the present invention, the insertion and removal tracks may take the form of guide channels which are arranged parallel to the chain drive and at a distance from its guide channel, wherein the distance between the chain and the guide channel of the

insertion/removal track approximately corresponds to the width of the work station wagon. On the outside of the wagon, guide rollers are then also provided, which run in the guide channel of the removal guide track after transfer from the chain to the removal guide track. At the transfer point,

5 the guide channel of the removal guide track has interruptions, which are closed by means of points tongues if no transfer is to take place. If the wagon, which passed by the transfer point is to be removed, the points tongues are switched in such a way that they guide the guide rollers of the wagon into the guide channel of the removal track.

10 The insertion point is correspondingly designed. When inserting a wagon, care should be taken to ensure that the work station wagon is inserted in an accurately positioned manner with respect to the connection element to the chain, and with respect to the embodiment of the present invention, that the carrier pin of the wagon is introduced into the carrier 15 cage of the chain.

Therefore, the present invention preferably provides that each work station wagon has a spacer with respect to the next wagon, wherein the spacing of the connection element parts on the chain (i.e., the carrier cages) have a spacing which corresponds to the length of the wagon and 20 spacer combined. In this way, the wagon to be inserted is inserted at the free place on the chain, wherein the following wagon with its spacer pushes the wagon to be inserted precisely into the position in which the connection to the chain takes place.

Preferably, the insertion guide track has a load-dependent drive in 25 which the maximum speed is higher than the chain speed. Preferably, the insertion guide track has a friction drive, which engages on the outer side (relative to the oval) of the wagon. This ensures that prior to transfer, the wagon to be inserted has a higher speed than the following wagon on the chain, so that during the transfer, the wagon to be inserted is pushed into 30 the transfer position by the spacer of the following wagon.

The invention will be explained in greater detail with the aid of the drawings which follow:

Fig. 1 shows a carousel 10, with the chain 1, circulating in an oval, on which the work station wagons denoted by Roman numerals circulate.

5 A removal guide track 20 and an insertion guide track 30 are also shown in diagrammatic form. The transfer points are denoted by the broken-lined circles 21 and 31.

The enlarged view of Fig. 2 shows that the circulating chain drive 1 comprising a guide channel 2, which is formed by the two guide strips 5 and 6, wherein the drive chain 3 runs inside the guide channel 2. The chain has carrier cages 4a, 4b, functioning as a connection element part on the chain side to receiving such connection element from the wagon. The carrier cages 4a, 4b are arranged at a regular spacing. Guide rollers 7a, 7b, which run in the channel 2 as long as the wagon is guided on the chain are provided laterally on the work station wagons denoted by Roman numerals and are removably fastened to carrier cages 4a and 4b, respectively.

The removal guide track 20 also consists of a channel 22, which is formed by guide strips 25 and 26. On the side facing away from the chain drive the work station wagons have guide rollers 8a and 8b which in the event of transfer are engaged by switchable points tongues 27a and 27b and are guided into the guide channel 22 of the removal guide track 20; see wagon II. On the side opposite the points 27a and 27b, the guide strip 5 comprises a break or interruption so that the guide rollers 7a and 7b belonging to the wagon to be removed, are moved out of the guide channel 2 and out of the carrier cage 4a and 4b, respectively.

Fig. 3 shows an enlarged view of the points tongues, wherein the numerals denote elements identical with Fig. 2. The top view shows the points tongues in the "transit" position, the bottom view shows the points tongues in the "transfer" position.

Fig. 4 shows the insertion of wagon X, still in the waiting position in Fig. 2, at the position in which wagon II is removed in Fig. 2. The end phase of the insertion, which explains the correct position for connection to the chain 3, is shown. In the region of the deflection 40 of the chain, the 5 work station wagons are considerably wider apart. In this region, wagon X is initially pushed in front of wagon I. At the time of transfer, i.e., when the guide rollers 8a and 8b of wagon X reach the points tongues 37a and 37b, wagon X to be inserted, is accurately positioned between wagons I and III via the spacer 9 so that the guide rollers 7a and 7b are accurately 10 positioned in the carrier cages 4a and 4b of the chain 3.

It will be readily apparent to the person skilled in the art that the connection elements between circulating chain and work station wagons, and the coupling elements to the insertion and removal guide tracks, may be designed differently from the views shown by way of example. For 15 example, they may take the form of switchable electromagnets or rocker heels. It is essential to the invention that the guiding of the work station wagons for the purposes of this invention, insertion takes place on the one side and removal takes place on the other side, so that complicated points, in which that wagons must pass over structures, are avoided on the 20 circulating chain drive. Both the circulating chain drive and the insertion and removal guide tracks may be arranged above the shopfloor without forming obstacles to the work station wagons travelling on their own wheels.

Although the invention has been described in detail in the foregoing 25 for the purpose of illustration, it is to be understood that such detail is solely for that purpose and that variations can be made therein by those skilled in the art without departing from the spirit and scope of the invention except as it may be limited by the claims.

WHAT IS CLAIMED IS:

1. A device for carrying out a sequence of working steps on travelling work station wagons comprising
 - a) an oval track wherein said work station wagons are
- 5 circulating, wherein said wagons comprise at least one detachable connection element connected to a circulating chain which moves said wagons;
- 10 b) at least one insertion and at least one removal guide track is provided on the outside of said oval track, wherein said at least one insertion and at least one removal guide track comprises a transfer point to which the chain is allocated;
- 15 c) at least one coupling element is further provided at each transfer point via which the wagons may be coupled into the guide tracks on the side opposite of the side of said wagons comprising at least one detachable element, with at least one switchable points element located on said guide track, which during the insertion position, release said at least one coupling element and bring about the engagement of said detachable connection element to said chain or during the removal position, couple the coupling elements and removably detach said at least 20 one detachable connection from said chain.
2. A device according to Claim 1, wherein each work station wagon has a spacer which defines the minimum distance between two wagons on said chain and the distance between said chain wherein said detachable connection element is removably connected to the chain at the transfer point is dimensioned in such a way that the wagons allocated to said detachable connection elements have touch-contact via the spacer.
- 25 3. A device according to Claim 1, wherein during insertion or removal of said wagon to said device, during transfer, said wagon to be transferred is pushed into position by the following wagon.

4. A device according to Claim 1, wherein said insertion guide track has a load-dependent drive, the maximum speed of which is higher than the chain speed.

5. A device according to Claim 4, wherein said drive is a friction drive.

6. A device according to Claim 1, wherein said chain comprises at least one carrier cage to receive said at least one detachable connection element.

DEVICE FOR INSERTING AND REMOVING
WORK STATIONS CIRCULATING ON A CHAIN

ABSTRACT OF THE DISCLOSURE

A device for carrying out a sequence of working steps on travelling work station wagons comprising an oval track wherein said work station wagons are circulating, wherein said wagons comprise at least one detachable connection element connected to a circulating chain which moves said wagons; at least one insertion and at least one removal guide track is provided on the outside of said oval track, wherein said at least one insertion and at least one removal guide track comprises a transfer point to which the chain is allocated; at least one coupling element is further provided at each transfer point via which the wagons may be coupled into the guide tracks on the side opposite of the side of said wagons comprising at least one detachable element, with at least one switchable points element located on said guide track, which during the insertion position, release said at least one coupling element and bring about the engagement of said detachable connection element to said chain or during the removal position, couple the coupling elements and removably detach said at least one detachable connection from said chain.

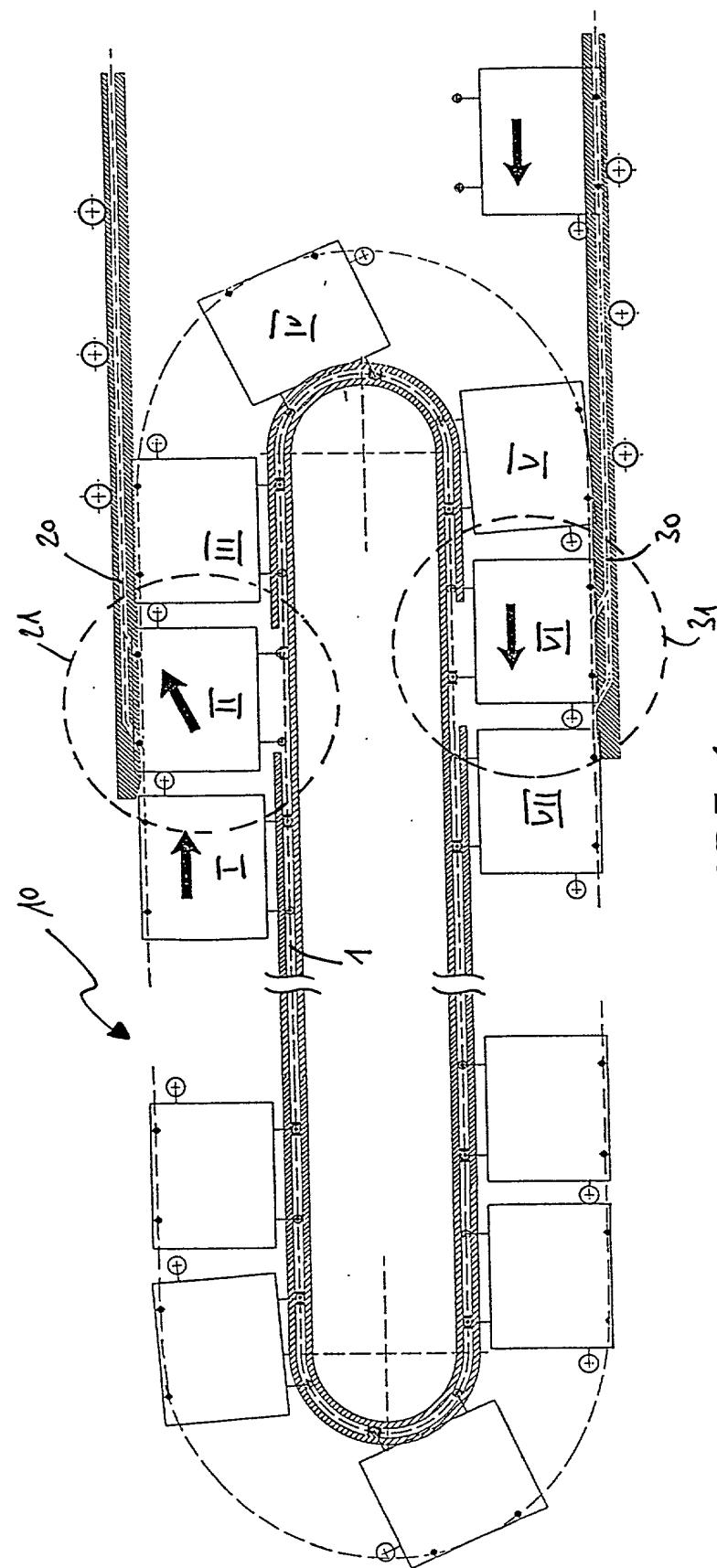


FIGURE 1

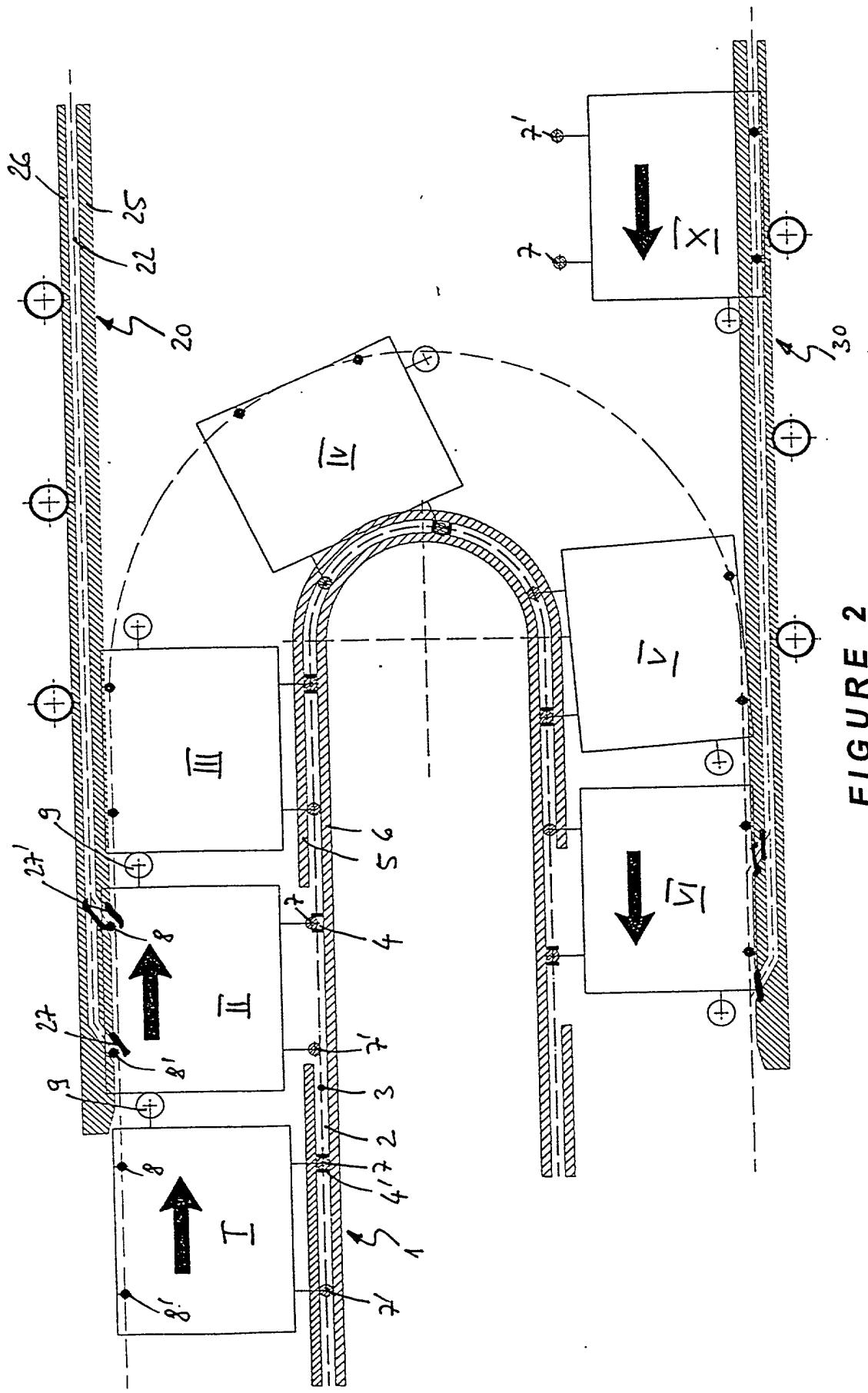
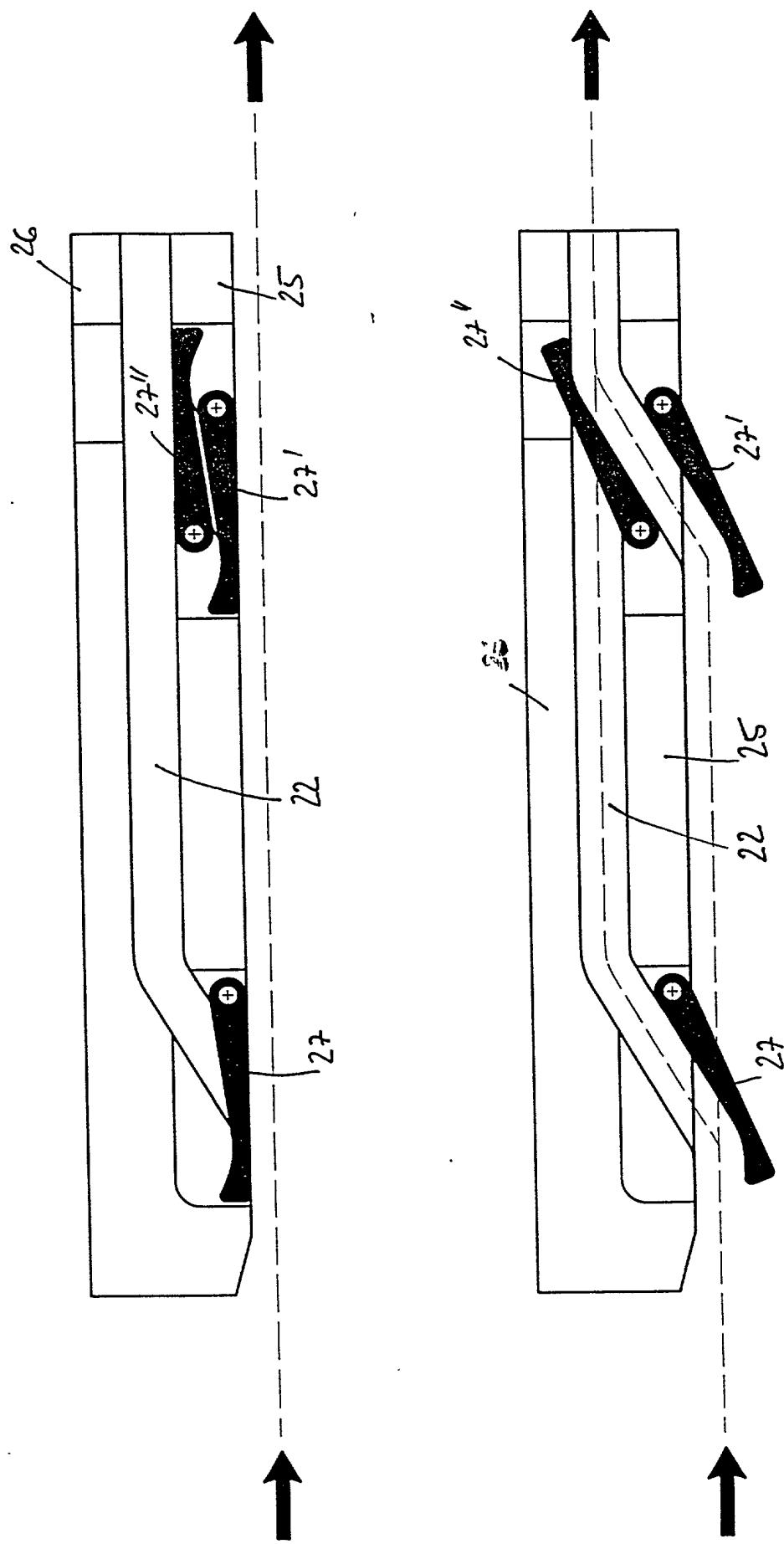


FIGURE 3



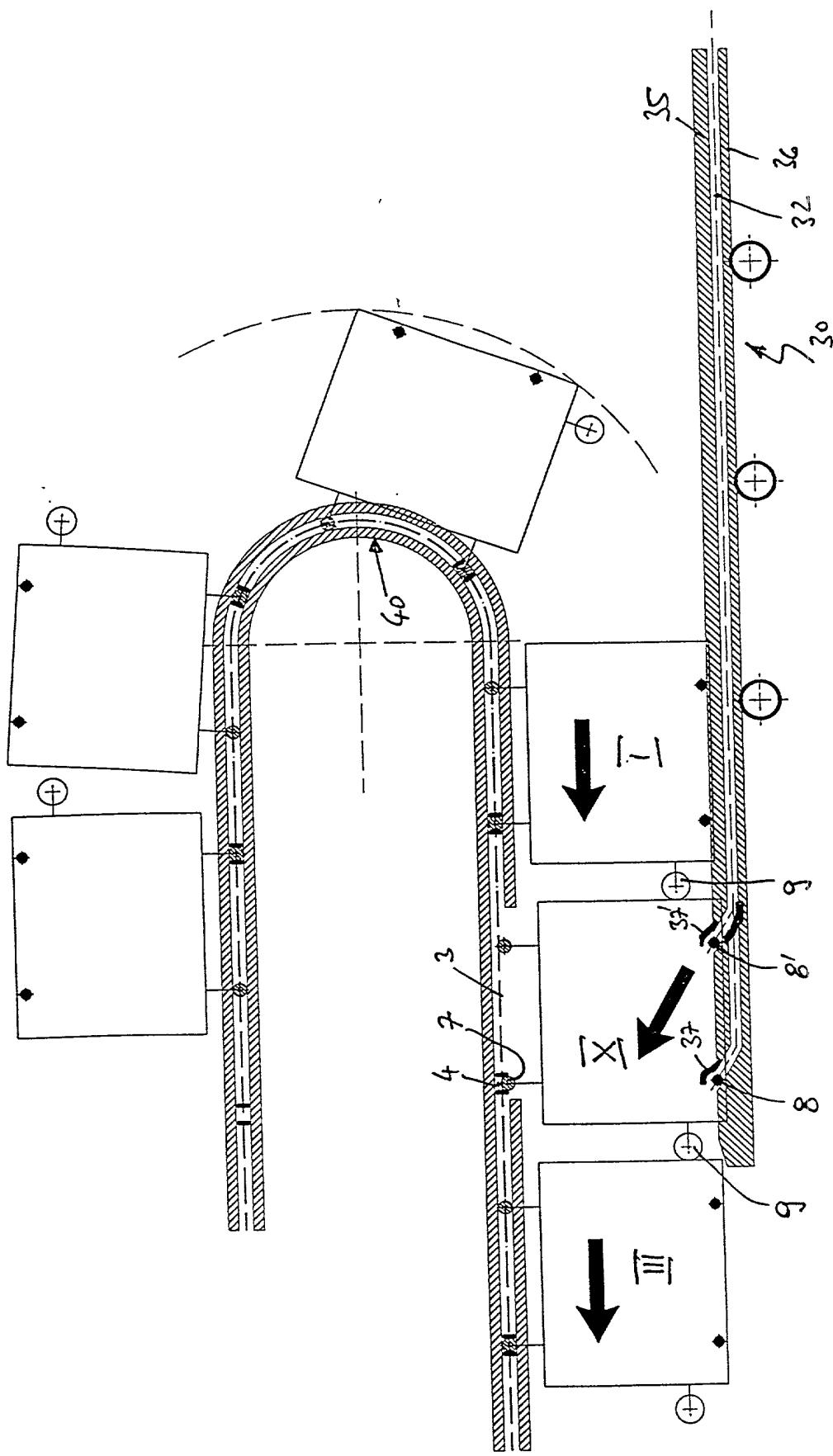


FIGURE 4

COMBINED DECLARATION AND POWER OF ATTORNEY

ATTORNEY DOCKET NO

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**DEVICE FOR INSERTING AND REMOVING WORK STATIONS
CIRCULATING ON A CHAIN**

the specification of which is attached hereto,

or was filed on _____ as

Application Serial No. _____

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s), the priority(ies) of which is/are to be claimed:

19752750.7
(Number)

Germany
(Country)

November 28, 1997
(Month/Day/Year Filed)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose the material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(Status)
		(patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status)

(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

JOSEPH C. GIL, Patent Office Registration Number 26,602
ARON PREIS, Patent Office Registration Number 29,426
LYNDANNE M. WHALEN, Patent Office Registration Number 29,457
THOMAS W. ROY, Patent Office Registration Number 29,582
RICHARD E. L. HENDERSON, Patent Office Registration Number 31,619
GODFRIED R. AKORLI, Patent Office Registration Number 28,779
N. DENISE BROWN, Patent Office Registration Number 36,097
NOLAND J. CHEUNG, Patent Office Registration Number 39,138
CAROL MARMO, Patent Office Registration Number 39,761
DIDERICO VAN EYL, Patent Office Registration Number 38,641

all of Bayer Corporation, Pittsburgh, Pennsylvania 15205-9741

Send Correspondence To: Patent Department Bayer Corporation 100 Bayer Road Pittsburgh, Pennsylvania 15205-9741	Direct Telephone Calls To: (412) 777-2349
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FULL NAME OF SOLE OR FIRST INVENTOR Bernd WILLING	INVENTOR'S SIGNATURE 	DATE 11/16/98
RESIDENCE 53225 Bonn,	CITIZENSHIP German	
POST OFFICE ADDRESS Stiftsstr. 8, 53225 Bonn,		